

ZeroUno^{PURE} DAC

Digital Analog Converter

Technical Description



CanEVER AUDIO®

INDEX

Introduction	3
Quick Overview	4
Block Diagram	5
The SABRE ³² DAC Chip	6
The Power Supply	7
The Motherboard	9
Clocks	9
Digital File Formats	10
MQA (Master Quality Authenticated)	10
Digital Inputs	10
USB Input	11
UNIVERSAL i2S Interface	12
Output Transformers	18
Attenuation Control	18
Outputs	19
Display	19
Absolute Polarity Listening	20
SETUP Menu	20
Cabinet	21
Conclusion	21
Product Specification	22

Introduction

Even very critical listeners accept computer audio as a music source very well. A real landmark in the evolution of computer audio has been the introduction of the *asynchronous transfer mode*, which is available for standard industry use since 2006, using the USB 2.0 interface of standard personal computers. Drivers based on this technology transfer digital music files from a computer to a DAC independently from the - mostly very inaccurately working - internal clock of the computer. All necessary timing now can be handled by much more precise oscillators inside the DAC.

Although the market today is flooded by a huge number of DACs ranging from prices of a few hundred Dollars to 10 to 20 k€ or even more, the claim made inside numerous marketing brochures, that the customer now (finally) gets the perfect sound forever is unfortunately (still) not true! It has been not true in 1982 as SONY and PHILIPS introduced the CD with fanfares of marketing - including the support of worldwide famous artists of those times (e.g. Herbert von Karajan) - and it is still not true today - sorry!

Not only is the number of different DACs offered today not easy to overlook by the interested customer. The sound of those DACs can be very different as well – independent from the individual price point. And even very expensive DACs sometimes offer on one hand a very detailed, but on the other hand a *crispy* sound full of details mainly in the mid to high frequencies, which impress the listener in the first run, but make our brain tired while listening for some hours.

Mostly very experienced customers, who grew up with vinyl sound, complain about the sometimes *harsh* and *cold* sound of DACs. For those, who are interested in all the great features of computer audio too, it is not an easy task to find a DAC, who's sound fits into the analogue sound patterns, they are used to.

Based on this market situation, CanEVER AUDIO®, supported by a group of experienced listeners, developed the *ZeroUno* ^{PURE} DAC.

The design goal was to create a DAC, which is able to present all the details of the recorded material, but never makes the brain of the user *nervous*. Instead of this, the *ZeroUno* ^{PURE} DAC should simply play *music* to enjoy and relax even after many hours of constant listening.

Quick Overview

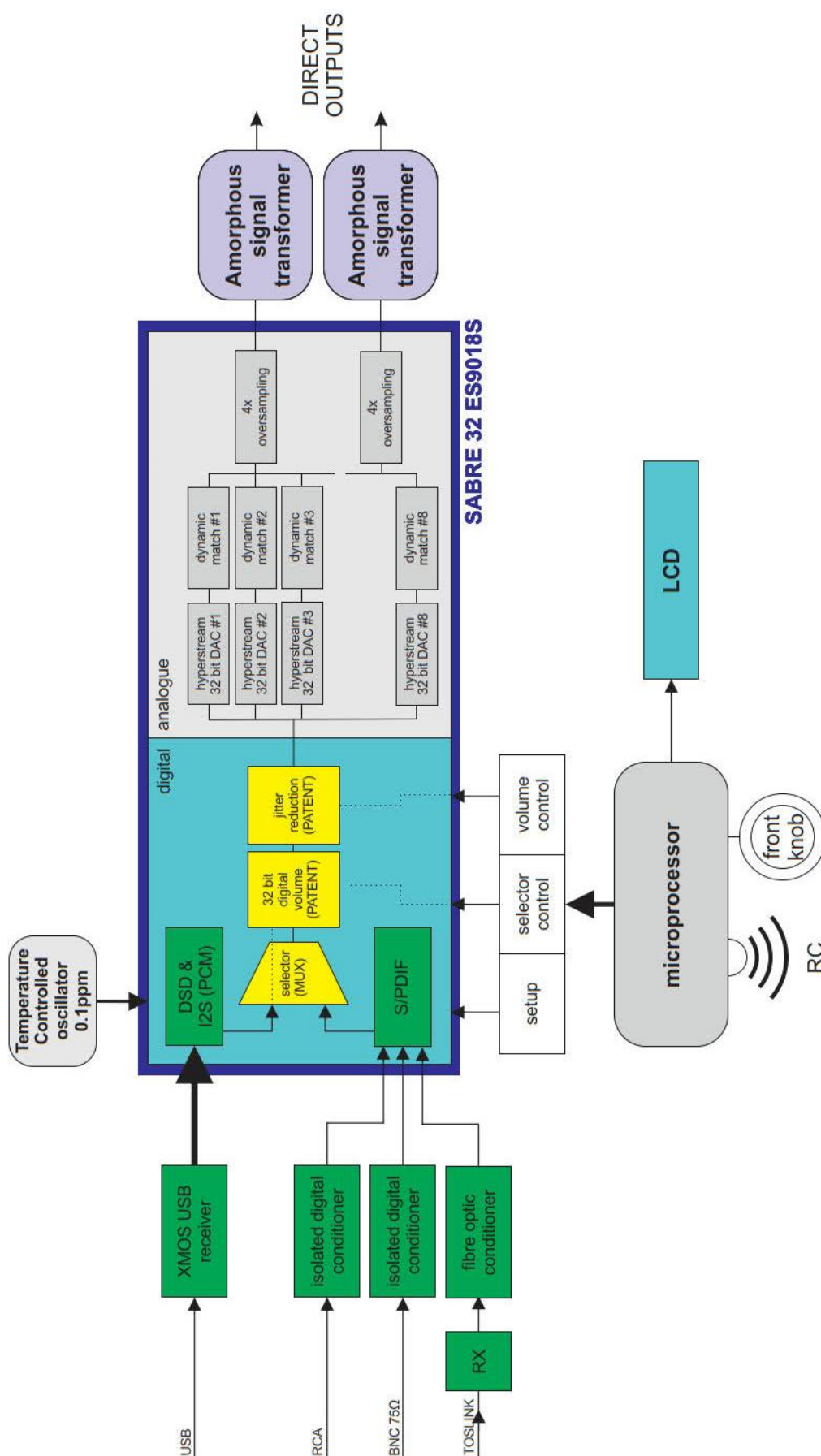
The natural sound and the rhythm of the music have been the key objectives during the design process of the *ZeroUno* PURE DAC.

This is achieved by:

- audiophile grade components
- DAC interstage coupled by special wounded Lundahl amorphous core transformers
- SABRE³² ES9018S DAC chip with proprietary audiophile firmware
- independently (quasi battery) powered USB input to eliminate electrical noise potentially induced by the USB cable from the connected computer
- four layers mother board for minimum internal wiring avoiding ground loops and electromagnetic induction
- dedicated power supply architecture
- comprehensive noise reduction for all digital circuits
- ultraprecise clocks

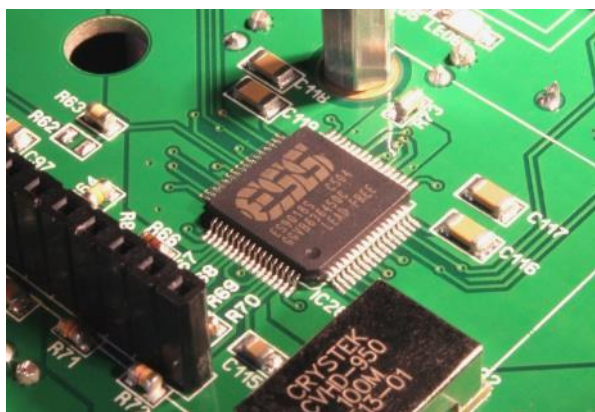


ZeroUno^{PURE} DAC - Block Diagram



SABRE³² DAC Chip

The *ZeroUno*^{PURE} DAC implements the ESS SABRE³² ES9018s. This chip incorporates eight individual DACs in dual differential coupling. But the ES9018s is not only a DAC! It is one of the most advanced industrial digital chips available today, working with 32 bits math, including 8 pairs of DACs with selectable resolution, IIR filter, FIR filter, de-emphasis filter, notch filter, 8 channels 32-bit volume control, patented jitter reduction algorithm and an 8 channels SPDIF multiplexer.



Although the SABRE³² is a very powerful component, it comes from the factory documented for a standard configuration only. This leads to a situation, in which many DACs, using this chip, make use only of the “default” standard configuration. The result often is a sound reproduction, which does not show the real performance level of the SABRE³².

To make full use of the complete SABRE³² feature set, it needs advanced engineering skills. For the *ZeroUno*^{PURE} DAC a special and complex firmware was developed to let the SABRE³² run at its full potential. The core implementation is a two channel DAC based on four paralleled pairs of differential DACs. The high quality internal 32-bit volume control of the SABRE³² guaranties for optimum channel separation and balance even at very low volume levels. Based on the patented internal jitter reduction module of the SABRE³² the *ZeroUno*^{PURE} DAC reaches a very low level of jitter.

As the **base** of the *ZeroUno*^{PURE} DAC is the ESS Technology SABRE³² 9018s chip, the **brain** is the firmware written for it.

The key feature of the *ZeroUno*^{PURE} DAC is the smooth and natural sound without any loss of the rhythm e.g. using the human voice and unamplified natural instruments as the test benchmark. The special internal configuration of the SABRE³² chip used for the *ZeroUno*^{PURE} DAC eliminates artefacts in the digital domain, which usually affect the quality of sound. Those kinds of distortions are more or less part of digital audio gear since the introduction of the CD in the early '80's and the *ZeroUno*^{PURE} DAC is developed mainly to avoid them.

The firmware of the *ZeroUno*^{PURE} DAC is stored inside a separate memory chip fitted in a socket on the board.

This offers the opportunity to upgrade in the future, if necessary, without any problems.

Power Supply

First of all, the performance in any electronic unit is depending on a professional power supply!

The different power supplies of the *ZeroUno*^{PURE} DAC base on three dedicated toroidal power transformers. One for the digital section and one for the analogue section of the DAC circuit as well as one for the control logic. All transformers sit in antimagnetic metal canisters using resin mix as damping material to avoid any kind of mechanical hum and vibrations.

The power supplies for the analogue and digital sections are split into two sections.

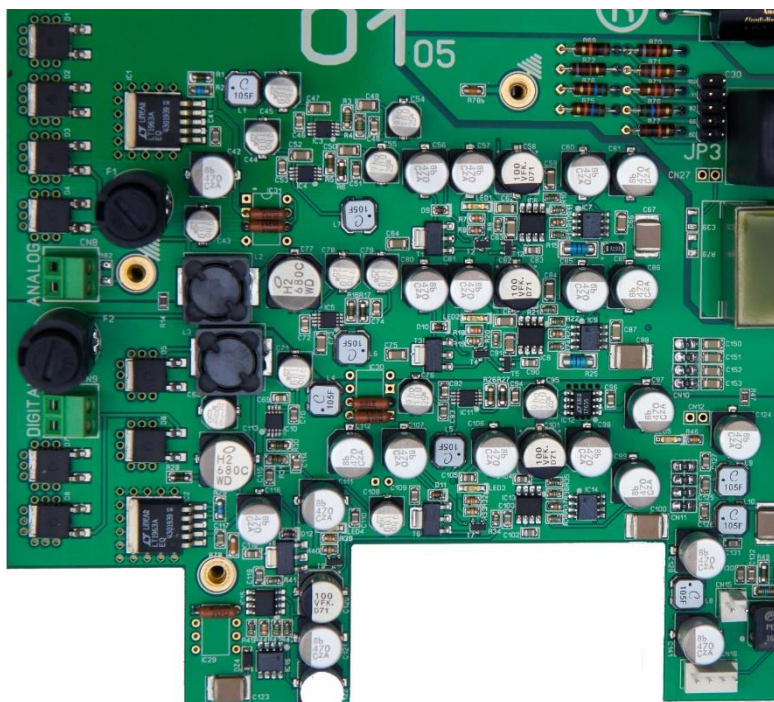
The first section is a low-noise power supply that:

- pre-regulates the voltages generating a very clean DC voltage
- isolates the second section from the domestic AC line reducing electric noise induced from there

As a result, the second level power supply is sourced by a very clean DC power and works in “quasi” battery mode.

The second section is made of 13 separated ultra-low noise power supplies and sources directly the core circuits of the *ZeroUno*^{PURE} DAC. Four of these ultra-low noise power supplies are consisting of discrete components only to reduce the noise to an extreme low level.

As the power supply is such an important part of the circuit, almost 60% of the time to develop the *ZeroUno*^{PURE} DAC was dedicated to the power supplies, to the signal path as well as to the paths of the power supplies and grounds.



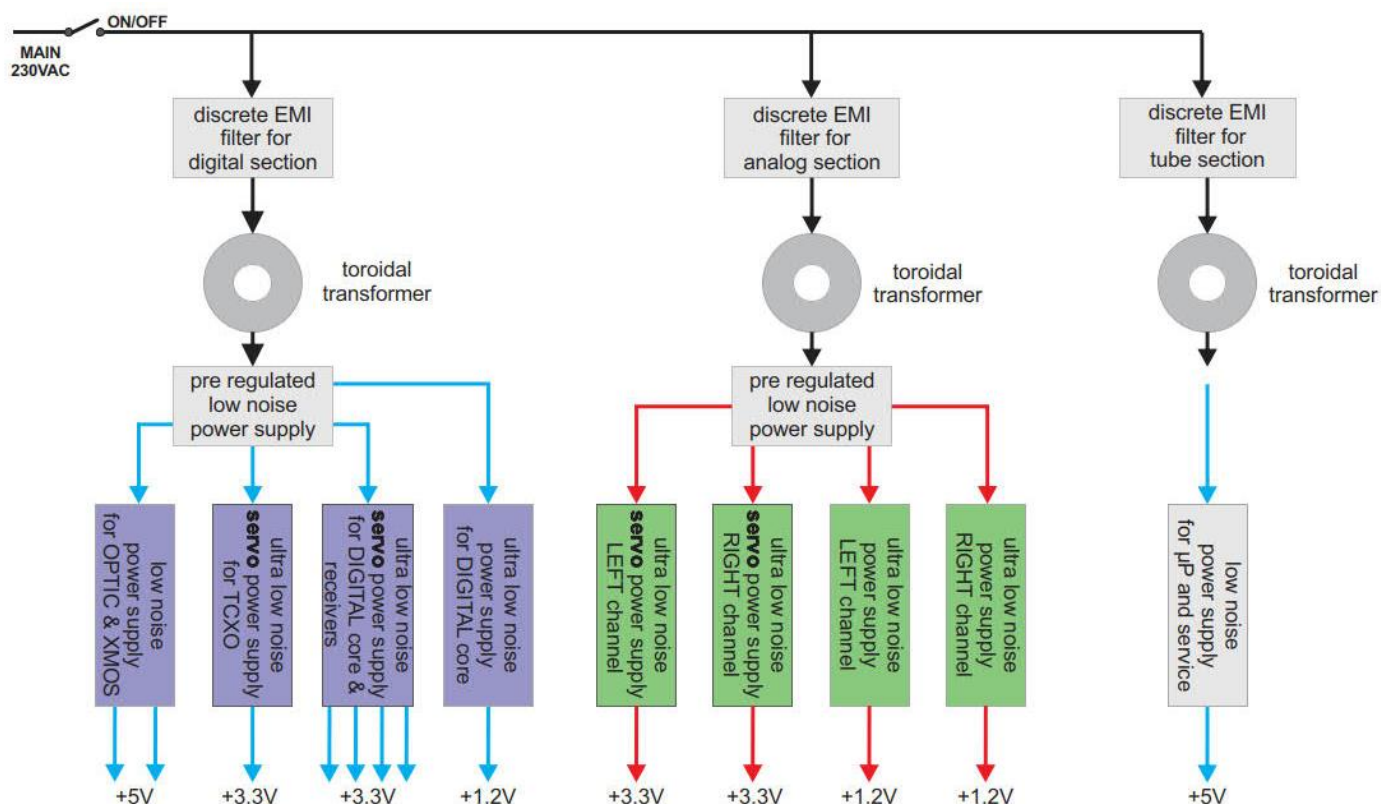
Selected components used in the power supplies of the *ZeroUno*^{PURE} DAC make sure to avoid noise created in the rectifier stage. The diodes in use here are almost free of any “converting spikes”, which usually have a negative impact on the sound quality of the audio signal.

The four “first level” ultra-low noise power supplies make use of the top audio grade operational amplifier AD797 from Analog Device. Commonly used in output stages, the *ZeroUno*^{PURE} DAC uses four of them in the power supplies.

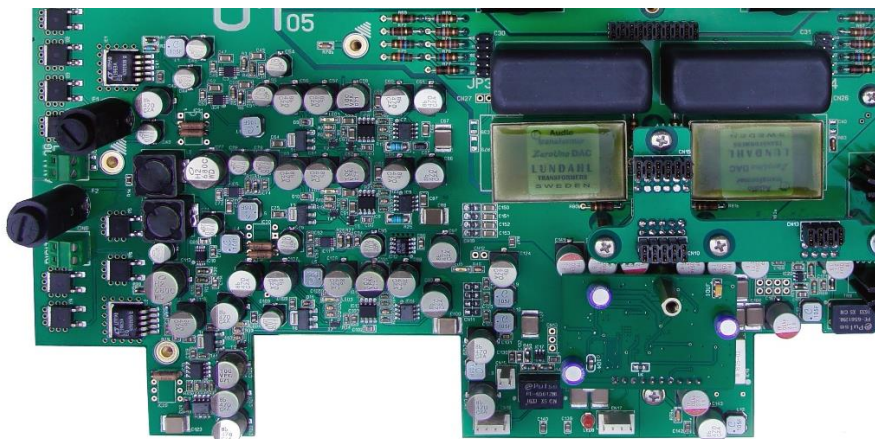
To improve the performance of the power supply furthermore almost all capacitors used in the circuit are *aluminium organic solid polymer* capacitors instead of electrolytic type. In addition, for top noise filtering, there are 13 individual coupling inductors implemented in the power supply.

This architecture is fundamental to keep the noise as low as possible. In many audio components this kind of noise is present, while affecting the sound in a negative way, creating harsh and cold sound textures.

This is power supply block diagram:



Motherboard



In many audio products, one can see a number of individual printed circuit boards connected by numerous cables. The higher the frequencies of the operated signals in the circuit are, the higher is the potential of negative influence on the signal quality by electromagnetic induction, e.g. into connecting cables. In a DAC, which can operate digital input signals up to 20 MHz, electromagnetic induction can become a nightmare for the engineer. The same is valid for the correct grounding of all the separate modules of the circuit.

To avoid such problems, the whole circuit of the *ZeroUno*^{PURE} DAC consists out of one single four-layer PCB with extra thick copper traces. This PCB supports ultra-short signal paths with minimal wiring. It avoids electromagnetic induction of noise and insures perfect grounding. Extra layers are reserved for the ground planes and the power lines of each stage. The same is valid for digital and analogue signals as well as for the tube output stage.

All the digital and analogue power supplies of the *ZeroUno*^{PURE} DAC (in total 15) are powered individually including the use of exclusive ground planes.

Clocks



For precise clocking, the *ZeroUno*^{PURE} DAC uses an ultra-low phase noise and ultra-low jitter voltage-controlled crystal oscillator.

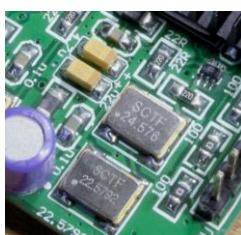
This 100MHz oscillator works as main clock to make sure, that the DAC works at maximum throughput and synchronizes the whole system.

Another two low noise oscillators control independently the sampling rate of the two PCM “families” of input signals:

- 44,1; 88,2; 176,4 and 352,8 kHz
- 48; 96; 192 and 384 kHz

The DSD “families”, which the DAC locks, are:

- 2,822; 3,072 MHz - DSD64
- 5,644; 6.144 MHz - DSD128



Digital File Formats

The *ZeroUno*^{PURE} DAC can play almost all the music formats being commercially available today, whether they are in PCM or DSD/DoP format.

PCM: 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz, 352.8kHz, 384kHz.

DSD-DoP: DSD64, DSD128.

The *ZeroUno*^{PURE} DAC is ready to play native DSD64, DSD128 and DSD256.

At the time of writing (07/2021) the official XMOS driver for consumer applications, that supports native DSD, is not yet released. As soon as this is the case the *ZeroUno*^{PURE} DAC can play native DSD files as well.

MQA (Master Quality Authenticated)

The *ZeroUno*^{PURE} DAC integrated the official full features MQA codec. CanEVER AUDIO® was one of the first companies that cooperated with MQA Ltd. to integrate the MQA codec into the DAC platform.

In the age of online music streaming, resolution usually takes the back seat to convenience and file size. However, MQA ensures high resolution, studio quality music at smaller file sizes that are easily to stream and store.

More, MQA applies a deblurring process to the audio records for a better behavior in reproduction.

Unlike MP3 and AAC files that compress music for lower file sizes which sacrifices quality, MQA uses a ‘music origami’ system. This ‘folds’ down the audio high-resolution recording into a file small enough to stream, then when it’s unpacked by the *ZeroUno*^{PURE} DAC it delivers CD-quality play back or original master quality.

A by-product is the “easy” interface to TIDAL streaming service.

Digital Inputs



The digital inputs are:

- 1x RCA, 1x true 75 Ohms BNC (optional, instead of the BNC input, a true 110 Ohms AES/EBU is available) and 1x OPTICAL for S/PDIF signals
- 1x USB Audio 2.0 port for a direct connection to a computer.
- Optional 1x i2S port for a connection to an i2S source.

All the S/PDIF digital inputs are galvanically isolated from the source by the use of a digital transformer.

USB Input

The USB interface is located in a separated module mounted above the SABRE³² to reduce the length of the signal path to a minimum. The firmware is stored in a dedicated flash memory, to allow easy future upgrading, if necessary.

The USB module is NOT powered through the connected computer by the standard and usually dirty 5V power lines of the USB cable! Instead, a dedicated ultra-low-noise power supply inside the *ZeroUno*^{PURE} DAC powers the USB receiver separately. Furthermore, a dedicated 1 Farad Super Cap buffers this power and acts almost like a pure battery power to the USB receiver chip.



USB signals demand high processing speed and efficiency, robust bit perfect audio streaming and flexible multi-format audio connectivity. To insure this, the *ZeroUno*^{PURE} DAC uses in the USB input board a chip of the xCORE-200 *multicore* family, the XMos XU216-512.

Unlike conventional microprocessors with only one CPU that handles the audio signal, the XU216-512 microprocessor has got inside 16 CPUs to execute multiple tasks parallel in real time.

By the dedicated *ZeroUno*^{PURE} DAC firmware this 16 CPUs are optimised for handling audio signals, offering:

- the XMos Hi-Res 2 AUDIO platform
- MQA CODEC
- very low response latency
- high-performance real-time processing,

All these features ensure a bit perfect transfer of all audio data.

The USB interface together with the standard stereo 2-channels XMos driver is 100% USB Audio 2.2 compliant and support signals up to 384 kHz in PCM mode as well as DSD64 and DSD128 in DoP mode. The driver for the Windows operating system works in ASIO or WASAPI mode. No additional driver is needed for Mac users, because the *ZeroUno*^{PURE} DAC is 100% compatible with the Mac OS and it's built in *Core Audio*.

The USB interface of the *ZeroUno*^{PURE} DAC is ready to support the native playback of DSD64, DSD128 and DSD256 files.

As soon as XMos will release the standard ASIO driver for the native DSD formats, this driver can be used with the *ZeroUno*^{PURE} DAC as well.

UNIVERSAL I2S interface



All the DACs in the CanEVER AUDIO® family can be equipped with an optional I2S input, which can be individually configured with the connector needed to interface with a number of CD transports from different vendors as PS-AUDIO, AYON AUDIO or NORTH STAR just to name a few.

It is possible to implement e.g. one HDMI socket into any *ZeroUno* DAC model in exchange of one of the four existing digital input. Based on the choice of CD-T the customer has made, the connection can be configured individually.

Since the early beginning of digital playback via CD's, the original signal read by the laser from the disc is coded in the so-called I2S format. Although these high-quality digital signals are basically available by definition, the digital data transfer between CD transports and DACs is usually based on the S/P-DIF format.

While the I2S format sends different digital data on separate wires from the transport to the DAC, in the S/P-DIF format all those different data lines are "modulated" into ONE combined signal, which then is transported on one simple coax (RCA) cable.

Inside the receiving DAC, the S/P-DIF signal has to be "demodulated" again.

Recently, several companies as PS-AUDIO or PROJECT "rediscovered" the I2S format to connect CD transports to DACs. Unfortunately, there is (still) no international norm of any kind, about which connectors and/or cables to use at both ends of the signal chain. This led to several proprietary vendor specific implementations for the I2S signal transport between a CD-T and a DAC. Obviously, none of those implementations allowed customers a free choice of a CD-T and a DAC as the I2S connections work between the products offered by only the same company.

The situation improved as more and more companies decided to use physical connectors and sockets based on the HDMI standard. While this in the end allowed customers to use standard HDMI cables to connect a CD-T and a DAC, the coding of the different pins inside the HDMI connectors still is based on proprietary solutions. So, customers still have a rare chance to mix between a CD-T and a DAC from different vendors for I2S signal transport.

CanEVER AUDIO® offers a very flexible implementation for almost any kind of HDMI based implementation - or other connectors - for the transport of I2S data. This feature allows customers using CanEVER AUDIO® *ZeroUno* DACs to connect to almost any CD-T with an I2S output based on HDMI and several other types of connectors currently offered on the market.

Basically, the i2S connection is based upon 4 different signals:

- DATA data
- LRCLK Left/Right word clock
- BCLK Base Clock
- MCLK Master Clock

Usually, the Master Clock is not needed in the interconnection between units.

On the contrary, in the S/P-DIF all 4 signals are coded into one signal, that at the receiving unit is again decoded into original signals, i.e.: DATA, LRCLK, BCLK, MCLK.

The management of the 4 basic signals separately, compared to the S/P-DIF protocol, eliminates the need for encoding and decoding the different signals at the start and the end of the signal chain, usually leading to better overall signal quality.

Unfortunately, the i2S interface is not standardized and there are many variants, different from one vendor to the other.

Aside from the different handling of the data, there are several different physical connectors on the market to link a CD-T and a DAC based upon:

- 1x 19 pins HDMI connector (balanced signals)
- 1x 8 pins RJ45 connector (unbalanced signals)
- 1x 5-6 pins DIN connector (unbalanced signals)
- 1x 9 pins D-SUB connector (unbalanced signals)
- 4x BNC connectors (unbalanced signals)



Again, the pinout is usually different from one brand to another!

Last but not least, the market is moving to a (almost final) de facto standard: the HDMI physical interface, with balanced signals transmitted.

Based on that, there are (still) two configurations for the pinout implemented inside the products of different vendors and at the time of this writing it is not clear, which configuration will be the “final” one or if there will be ONE solution ever.

Family #1: Sonore, PS Audio, Mola Mole, M2Tech, Aune, Denafrips, Holo Audio, Empirical Audio, Audio-gd, K&K Audio, Musica Pristina, Channel Islands Audio, Sthl~Tek, DiDiT High-End, Matrix, HiFime, X-Sabre

Family #2: Pink Faun, Audiobyte, Rockna, Wadia, Singxer, SMSL, LKS, Gustard

Note All trademarks and registered trademarks are the property of their respective owners



Fig.1 The ZeroUno^{PURE} DAC with the standard proposal for the i2S: RCA SPDIF, Optic, USB, i2S HDMI

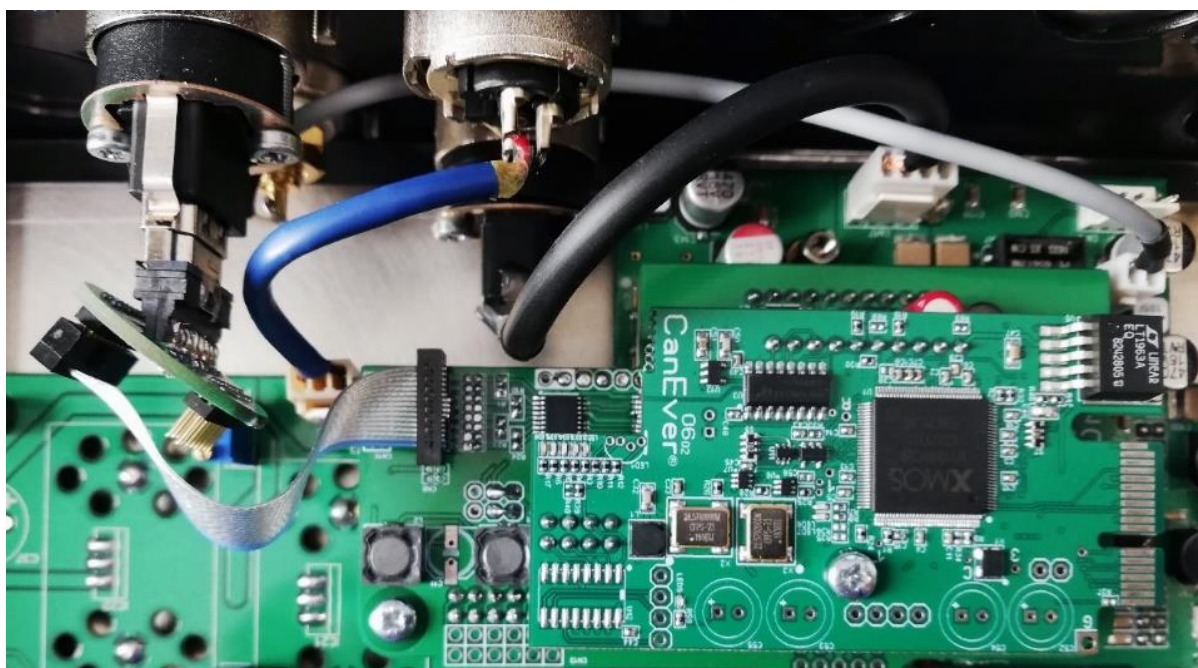


Fig.2 The ZeroUno^{PURE} DAC with the Neutrik HDMI socket on the left to interface the HDMI sources

To change the configuration of the HDMI pins between the (currently) two most popular implementations, it is possible to switch from the family #1 to the family #2 by only moving the connector inside the unit from one socket to the other.

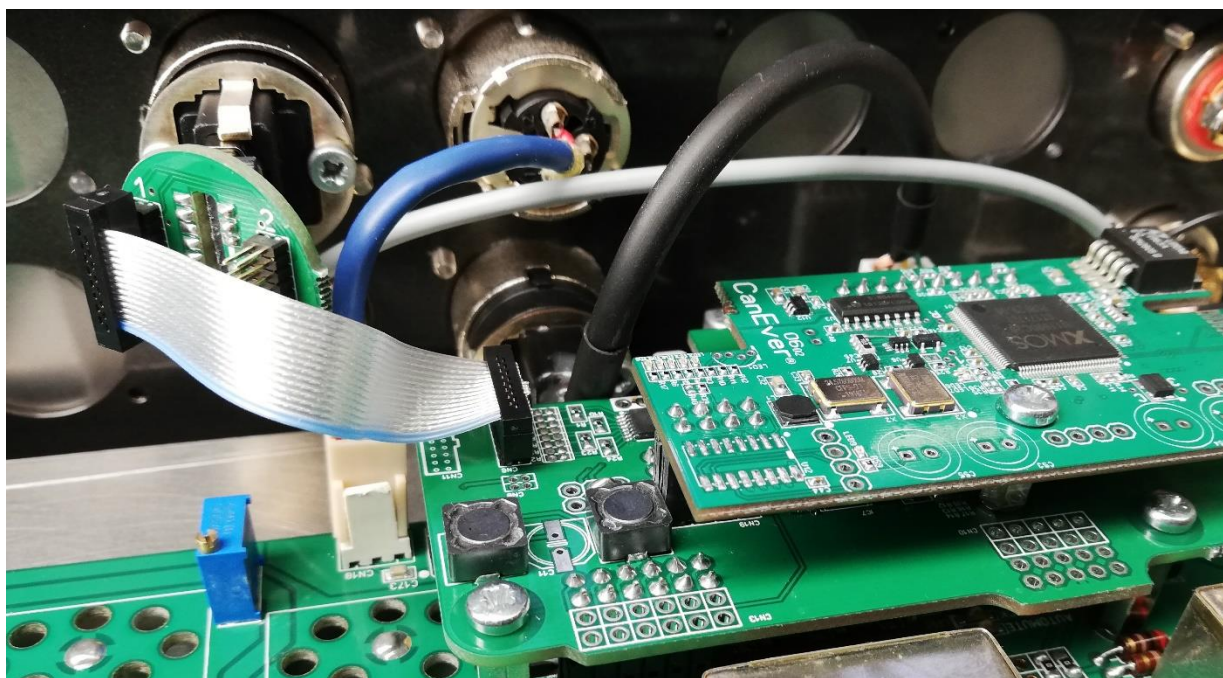


Fig.3 The ZeroUno^{PURE} DAC family #1 input used

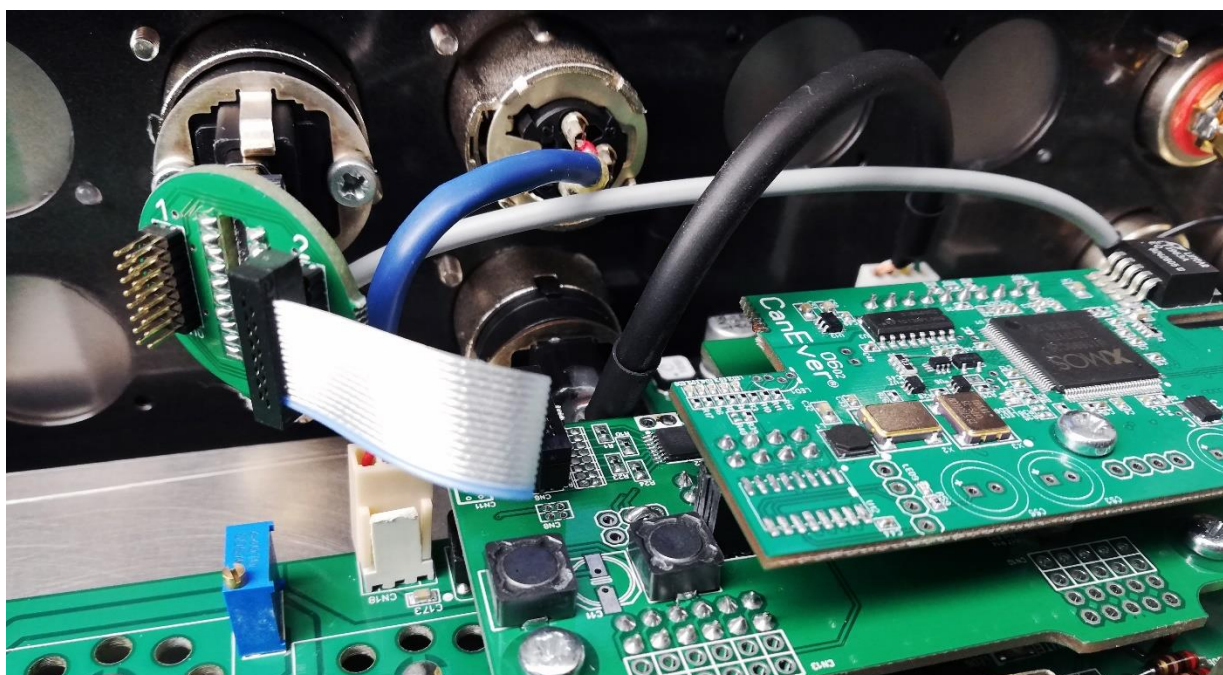


Fig.4 The ZeroUno^{PURE} DAC family #2 input used

Beside HDMI, the *ZeroUno*^{PURE} DAC can interface to a CD-T based on RJ45, DIN or D-SUB type of connectors as well easily by exchanging one of the Neutrik connectors at the rear panel. Even more than one I2S input is possible e.g. using different physical connectors and cable configurations.



Fig.5 The *ZeroUno*^{PURE} DAC with Optic, USB, i2S HDMI, i2S RJ45

For any kind of uncommon pinout, the interface inside the *ZeroUno*^{PURE} DAC is equipped with an integrated “patch panel” for each single wire, so that the mapping of any individual configuration of cables / signals can be adopted easily.

The CD-T must be specified at the time of ordering, so the patch panel can be setup prior to shipment. The patch panel configuration can be changed later at any time by factory service.

List of the device that the *ZeroUno* DAC i2s interface is able to emulate.

HDMI family #1	Sonore, PS Audio, Mola Mole, M2Tech, Aune, Denafrips, K&K Audio, Empirical Audio, Audio-gd, Musica Pristina, Channel Islands Audio, Holo Audio, Sthal~Tek, DiDiT High-End, Matrix, Hifime, X-Sabre; these units have the same pinout.
HDMI family #2	Wadia, Pink Faun, Audiobyte, Rockna, Singxer, SMSL, LKS, Gustard; these units have the same pinout.
HDMI custom	Wyred4Sound, JAVS, SMSL, Love Harmony, Astin Trew; all these units have a different pinout. They are totally custom solutions.
RJ45 family #1	MHDT, Empirical Audio, Hiface (modified), KingRex; these units have the same pinout.
RJ45 family #2	M2Tech, QLS, Area, Audio-gd; these units have the same pinout.
RJ45 custom	Ayon, Aqua, YBA, Accuphase, Pop Pulse, Teradak, North Star Design, MSB Technology, Lite Audio, Melodious Audio, Yulong, Soundaware, Zanden Audio, Denafrips, APL HiFi; all these units are with a different pinout, totally custom.
DIN 6 pins family	Camelot, Audio Alchemy, April Music, Perpetual Audio, Channel Islands Audio
4x BNC	BMC Audio

Note All trademarks and registered trademarks are the property of their respective owners.

Same example of configurations



Fig.6 The standard ZeroUno^{PURE} DAC
SPDIF RCA, AES/EBU3, USB, OPTIC



Fig. 7 The ZeroUno^{PURE} DAC with the i2S input:
SPDIF RCA, i2S HDMI, USB, OPTIC



Fig. 8 The ZeroUno^{PURE} DAC with the i2S input (optional configuration):
i2S RJ45, i2S HDMI, USB, OPTIC

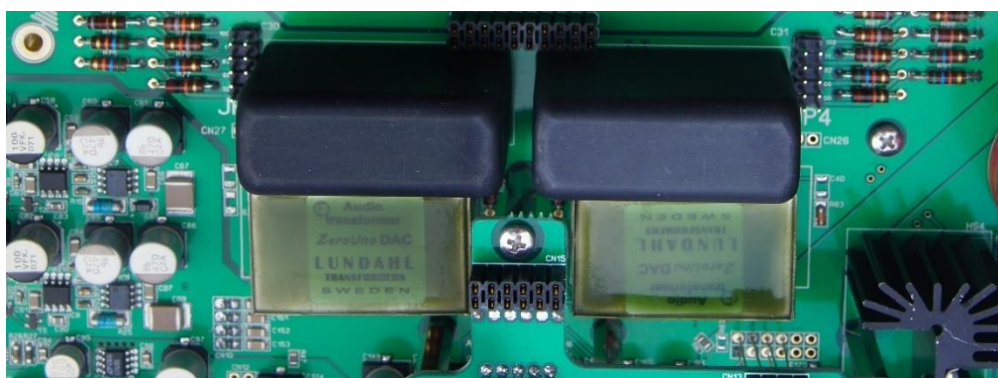


Fig. 9: The ZeroUno^{PURE} DAC with the i2S capability (special configuration):
i2S RJ45, i2S HDMI, SPDIF RCA, AES/EBU3, USB, OPTIC

Output Transformers

The output for the left and right channel of the SABRE³² DAC chip connects directly to a pair of high-performance amorphous core transformers. The result is a minimum number of components in a signal path, which is as clean & short as possible: no capacitors, no resistors and no active components ... only a single transformer for each channel!

The output transformers are produced by Lundahl due to CanEVER AUDIO® specifications. The coils are wound around an amorphous core resulting in high sensitivity. There is no loss of any detail in the signals even at very low levels. The very special winding of the transformers guaranties a perfect transmission even of very low frequencies. Furthermore, the transformers perform very linear across the audio band and even more important, within the human audio bandwidth.



Attenuation Control

The *ZeroUno*^{PURE} DAC comes with a high-performance attenuator.

The attenuation control performs in the 32 bits resolution without any destructive or audible noise in the audio band because the input audio formats managed are maximum of 24bits resolution. Really, by the 32bits architecture, there are 8 bits over the 24bits of the input signals, useful to attenuate the signal itself without interfering with it. The input signal is left untouched. 8 bits are equivalent to 48dB ($2^8=256$ and $20\log 256=48$) of “perfect” attenuation.

Moreover, by the 32 bits attenuator, both channels are having exactly the same level even if attenuated.

The attenuation control can be adjusted by the “volume” knob located on the right side of the *ZeroUno*^{PURE} DAC front panel.



The rotary encoder mounted behind the volume knob is a high-quality ELMA rotary encoder.

To ensure maximum mechanical stability the axis of the encoder is supported by an additional bearing.

While turning the knob the user has a “smooth” but precise tactile feedback.

When no attenuation is used, the display shows “*bypass*” to mean bypass.

Outputs



The *ZeroUno*^{PURE} DAC is equipped with a pair of RCA unbalanced outputs.

Both couple of outputs can be used at the same time. This is useful for bi-amping and to connect a subwoofer if any.

Optionally, the *ZeroUno*^{PURE} DAC can be equipped with one RCA output and one XLR balanced output.

Suggested input impedance of the power amplifier should not be below 47Kohms.

The maximum voltage swing at the outputs is 9.0Vpp, equivalent to 3.2 Vrms.

Display

For optimal user control the *ZeroUno*^{PURE} DAC has a display located in the centre of the front plate. In *PLAY* mode this display shows if the input signal is locked, the attenuation, the level, the balance, the absolute polarity and the selected input. The name of the input can be changed by the menu.



Once an input signal is detected, the lock is displayed.

In *SETUP* mode the display shows all possible parameters selectable by the user and their related values.

After the defined time (e.g. 10s | 20s | 30s | 40s | 50s) of no user interaction via the buttons at the front of the DAC the display turns off.

Based on individual settings in the *SETUP* menu, the display could stay ALWAYS ON as well, if preferred by the customer.

Absolute Polarity Listening

As during the recording, the mastering and the production process the absolute polarity of the music data is changing many times, the final digital master file can be stored in inverted polarity. As some listeners are very sensitive to this fact, the *ZeroUno*^{PURE} DAC gives the customer the option to change the absolute polarity of the music file by entering into the SETUP menu.



After pressing the toggle switch, the display shows “PHASE+” (absolute polarity) or “PHASE-” (inverted absolute polarity) in large letters for 5 seconds.

SETUP Menu

The *ZeroUno*^{PURE} DAC comes completely configured by the factory for top performances!

To give the customer maximum flexibility to configure the unit to according to his personal taste, the SETUP mode is implemented. To enter the SETUP mode the customer has to press the SETUP button at the front for a **minimum of 2 seconds** and then release.

The available parameters follow.

PARAMETER	VALUE
Level	range from -20dB to 0.0dB
Use-Skip an Input	select the inputs to keep active or to bypass
Balance	range from 5.0dB left to 5.0dB right in steps of 0.5dB
Phase	absolute polarity vs. inverted absolute polarity
LCD Brightness	display brightness: 50% 60% 70% 90% 100%
LCD Time Out	display timer: 10s 20s 30s 40s 50s always on
Sampling Rate	show hide (in large digits for 5 seconds)
Use of Front LED	switch on or off the front LED
Name	change the name of the inputs

For each parameter its value is visible at the display.

Rotating the right knob changes the parameter values.

To select the next parameter the SETUP button needs to be pressed shortly.

If no button is pressed or the right knob is not turned within a period of 10 seconds, the *ZeroUno*^{PURE} DAC automatically stores the values shown at the display and switches back to the PLAY/MUTE mode.

A countdown running on the second row of the display assists the user during this process.

All selected parameters are stored in a non-volatile memory, so that the setup information is not lost after powering off the unit.

To RESTORE the factory values the SETUP button at the front panel of the *ZeroUno*^{PURE} DAC must be pressed for at least 10 seconds.

Cabinet

The engine of a car can exhibit the maximum performance only, if it has a frame, which can manage the vibrations. This is a mechanical law to follow not to lose power of the engine. The engine in our case is the DAC chip with its 15 power supplies plus the tube buffer and its power supply. The frame in our case is the cabinet, which has to be deaf and rigid without compromises.

It is important to understand, that the cabinet is an “active” part of the *ZeroUno*^{PURE} DAC.

The cabinet of the *ZeroUno*^{PURE} DAC is made of a combination of aeronautic alloy and sheets of stainless steel joined together to create a rigid, light and vibration free structure. Moreover, the cabinet has a coating of acrylic resin, which further dampens the structure and avoids vibrations. While the cabinet is acoustically “dead”, it shields the electronics inside from electromagnetic interference (EMI) from outside as well.

Conclusion

Although the *ZeroUno*^{PURE} DAC is offering high performance technical data, it is impossible to judge it's value based on these only. The result of the D/A conversion in the *ZeroUno*^{PURE} DAC is a natural, warm, not harsh and very dynamic sound, which is not polished to exhibit the last possible details, but to *“let the music play ...”*

Looking at directly heated triode-based tube amps (e.g. 300B, 2A3 or 211 and 845) or tube amps in general one can make similar observations. From a pure engineering point of view, there is no reason to prefer a tube amplifier over a transistor-based amplifier. Most of the technical measurements are even voting against a tube amp. However, if we do not leave it up to the instruments alone to qualify such an amp and instead we use our ears to listen and feel our emotions, the picture in many cases can change a lot!

Have fun with the *ZeroUno*^{PURE} DAC!

Product Specification

- The circuit of the *ZeroUno* ^{PURE} DAC is based on three integrated hardware platforms: ESS Technology SABRE³² ES9018S DAC, XMOS XU216-512- and Atmega1284p.
- For optimum performance the SABRE chip runs on a proprietary implementation of special developed firmware
- One motherboard based on a four-layer PCB with extra thick copper traces to achieve ultra-short signal paths with minimal wiring, to avoid electromagnetic induction of noise and to insure perfect grounding
- Discrete built power supplies for the digital and the analogue section using two toroidal transformers, last generation of ultra-low noise rectifier diodes and high-quality audio operational amplifiers AD797
- Discrete built ultra linear power supplies for the control logic using one dedicated toroidal transformer followed by last generation of ultra-low noise rectifier diodes, double π filter, audio grade resistors and capacitors
- Comprehensive noise regulation for all digital circuits
- Jitter free operation by patented high performance algorithm
- Integrated 32 bits attenuator control with a residual noise below -130dB for best performances even if at very low output levels
- On board output level setup to match different sensitivity of the direct connected power amplifiers
- PCM and DSD digital roll-off filters as well as asynchronous sample rate conversion of the Delta-Sigma DACs are user selectable in the set-up menu
- Voltage-compensated, ultra-low phase noise and low jitter crystal oscillators (clock) acts as master clock. Two separated clocks for sampling families of 44.1, 88.2, 176.4, 352.8 kHz and 48, 96, 192, 384 kHz
- DAC output stage with shortest possible signal path based on custom made amorphous audio transformers produced by Lundahl with first order discrete analogue filter for best THD and digital noise suppression
- Separately powered USB chip by a “quasi battery power supply” using a 1,0 Farad super-cap to avoid any distortion induced by the connected computer (no connection to the +5V powerline of the USB cable)
- USB input based on XMOS xCore audio chip with bit perfect transfer for 16bit, 24bit or 32bit data in PCM format up to 384 kHz including support for native DSD and DoP
- 4 Digital-Inputs: 1x USB 2.0; 1x true AES/EBU 110Ohm XLR or (optional) true S/PDIF 75 Ohm BNC or (optional) i2S interface; 1x S/PDIF RCA; 1x S/PDIF OPTICAL
 - USB input compatible with following audio formats via PC and MAC:
 - PCM: 44.1; 48; 88.2; 96; 176.4; 192; 352.8 and 384 kHz up to 32 bits
 - DSD (DoP): 2.822 MHz | DSD64, 3.072 MHz, 5.644 MHz | DSD128
 - SPDIF inputs (AES/EBU, BNC, RCA) compatible with PCM signals from 44.1, 48, 88.2, 96, 176.4 and 192 kHz, up to 24 bits. The OPTICAL input accepts music files with a resolution up to 24/96 kHz
- Integrated Official, full features, MQA CODEC
- 2x RCA unbalanced outputs, 9V_{pp} | 3.2V_{rms}
- LCD Display with variable brightness, changing letter size for better reading from listening position
- No drivers required for LINUX or MAC OSX
- CanEVER AUDIO® USB Audio 2.0 driver available for Windows XP/Vista/7/8/10

The Specifications in this document are subject to change without notice.

CanEVER AUDIO®

Canever Ing. Mario via Como 32 30027 San Donà di Piave - Venice - Italy
 ph. +39 335 708 2 807 mail info@canever.eu web www.canever.eu
 Copyright © 2015-2021 Canever Ing. Mario - All rights reserved